STANDARDS OF THE

TUBULAR EXCHANGER

MANUFACTURERS ASSOCIATION

TENTH EDITION

TUBULAR EXCHANGER MANUFACTURERS ASSOCIATION, INC.
Richard C. Byrne, Secretary
www.tema.org

NO WARRANTY

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The Standards herein are recommended by The Tubular Exchanger Manufacturers Association, Inc. to assist users, engineers, and designers who specify, design, and install tubular exchangers. These standards are based upon sound engineering principles, research, and field experience in the manufacture, design, installation, and use of tubular exchangers. These standards may be subject to revision as further investigation or experience may show is necessary or desirable. Nothing herein shall constitute a warranty of any kind, expressed or implied, and warranty responsibility of any kind is expressly denied.

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PREFACE

Tenth Edition – 2019

The Tenth Edition of the TEMA Standards was prepared by the Technical Committee of the Tubular Exchanger Manufacturers Association. In addition to updated graphics and charts with a modernized appearance, numerical analysis of flexible shell elements, comprehensive rules for the design of horizontal saddle supports, dimensional data for various standard flanges, guidelines for distributor belts, and a fouling mitigation design study have been added.

The Editor acknowledges with appreciation the contributions by Tony Paulin and Fred Hendrix at Paulin Research Group (PRG) for assistance with the Flexible Shell Element numerical analysis, and the Heat Transfer Research Institute (HTRI) for their guidance on distributor belts and with fouling mitigation.

The Editor also acknowledges with appreciation the many years of service and contributions by Jim Harrison to the TEMA Technical Committee.

Daniel Gaddis, Editor

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CONTENTS

NOTES TO USERS OF THE TEMA STANDARDS

Three classes of Mechanical Standards, R, C, and B, reflecting acceptable designs for various service applications, are presented. The user should refer to the definition of each class and choose the one that best fits the specific need.

Corresponding subject matter in the three classes of Mechanical Standards is covered by paragraphs identically numbered except for the class prefix letter. Paragraph numbers preceded by RCB indicates that all three classes are identical. Any reference to a specific paragraph must be preceded by the class designation.

The Recommended Good Practice section has been prepared to assist the designer in areas outside the scope of the basic Standards. Paragraphs in the Standards having additional information in the RGP section are marked with an asterisk (*). The reference paragraph in the RGP section has the identical paragraph number, but with an "RGP" prefix.

It is the intention of the Tubular Exchanger Manufacturers Association that this edition of its Standards may be used beginning with the date of issuance, and that its requirements supersede those of the previous edition six months from such date of issuance, except for heat exchangers contracted for prior to the end of the six month period. For this purpose, the date of issuance is April 8, 2019.

Questions by registered users on interpretation of the TEMA Standards should be submitted online at www.tema.org. Questions requiring development of new or revised technical information will only be answered through an addendum or a new edition of the Standards.

Upon agreement between purchaser and fabricator, exceptions to TEMA requirements are acceptable. An exchanger may still be considered as meeting TEMA requirements as long as the exception is documented.

N-1 SIZE NUMBERING AND TYPE DESIGNATION - RECOMMENDED PRACTICE

It is recommended that heat exchanger size and type be designated by numbers and letters as described below.

N-1.1 SIZE

Sizes of shells (and tube bundles) shall be designated by numbers describing shell (and tube bundle) diameters and tube lengths, as follows:

N-1.1.1 NOMINAL DIAMETER

The nominal diameter shall be the inside diameter of the shell in inches (mm), rounded to the nearest integer. For kettle reboilers the nominal diameter shall be the port diameter followed by the shell diameter, each rounded to the nearest integer.

N-1.1.2 NOMINAL LENGTH

The nominal length shall be the tube length in inches (mm). Tube length for straight tubes shall be taken as the actual overall length. For U-tubes the length shall be taken as the approximate straight length from end of tube to bend tangent.

N-1.2 TYPE

Type designation for complete assemblies shall be by letters describing front end stationary head types, shell types, and rear end head types, in that order, as indicated in Figure N-1.2. Type designations shall be used as applicable for partial heat exchanger assemblies.

N-1.3 TYPICAL EXAMPLES

N-1.3.1

Split-ring floating head exchanger with removable channel and cover, single pass shell, 23 1/4" (591 mm) inside diameter with tubes 16' (4877 mm) long. SIZE 23-192 (591-4877) TYPE AES.

N-1.3.2

U-tube exchanger with bonnet type stationary head, split flow shell, 19" (483 mm) inside diameter with tubes 7' (2134 mm) straight length. SIZE 19-84 (483-2134) TYPE BGU.

N-1.3.3

Pull-through floating head kettle type reboiler having stationary head integral with tubesheet, 23" (584 mm) port diameter and 37" (940 mm) inside shell diameter with tubes 16' (4877 mm) long. SIZE 23/37-192 (584/940 -4877) TYPE CKT.

N-1.3.4

Fixed tubesheet exchanger with removable channel and cover, bonnet type rear head, two pass shell, 33 1/8" (841 mm) inside diameter with tubes 8' (2438 mm) long. SIZE 33-96 (841-2438) TYPE AFM.

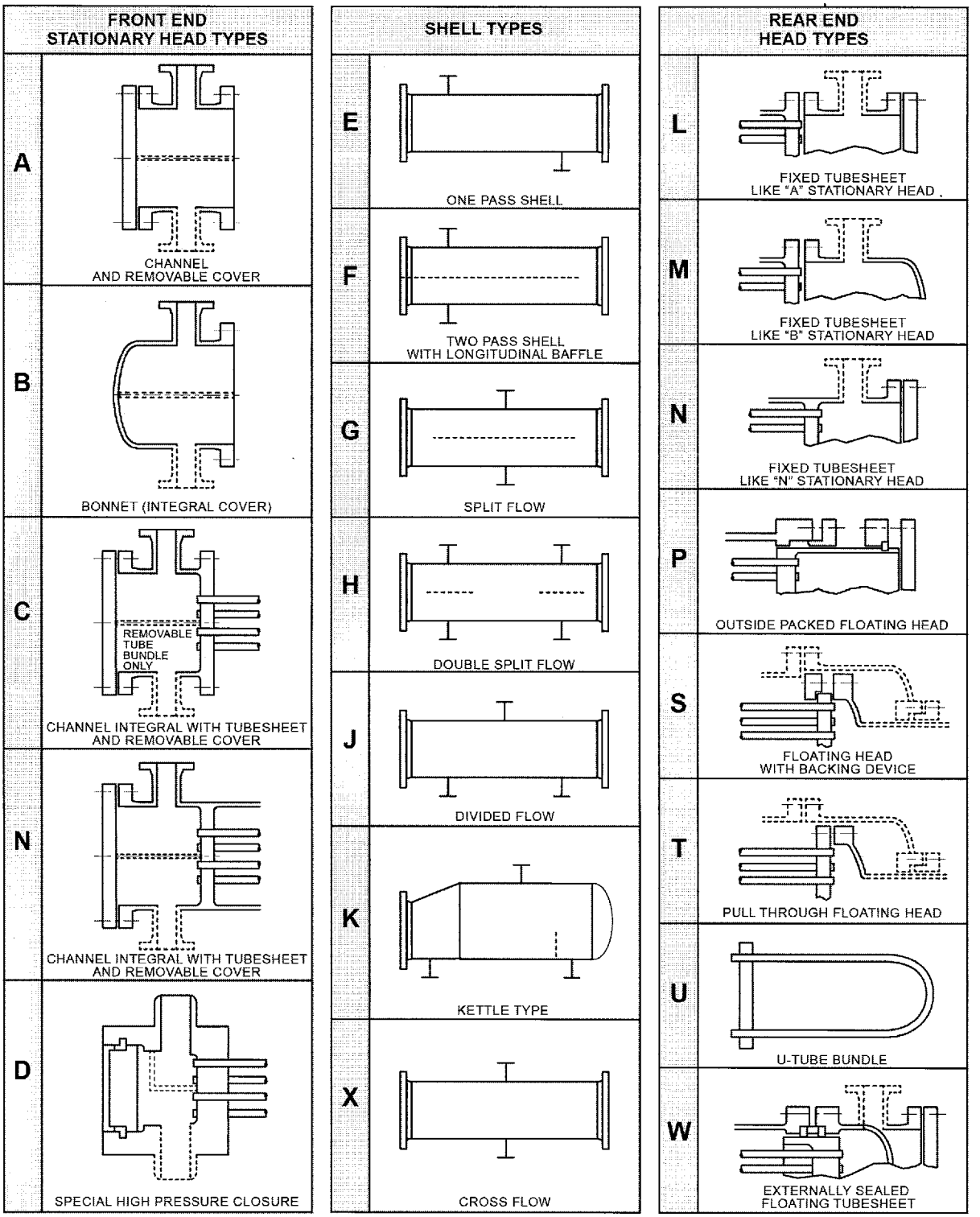
N-1.3.5

Fixed tubesheet exchanger having stationary and rear heads integral with tubesheets, single pass shell, 17" (432 mm) inside diameter with tubes 16' (4877 mm) long. SIZE 17-192 (432-4877) TYPE NEN.

N-1.4 SPECIAL DESIGNS

Special designs are not covered and may be described as best suits the manufacturer. For example, a single tube pass, fixed tubesheet exchanger with conical heads may be described as "TYPE BEM with Conical Heads". A pull-through floating head exchanger with an integral shell cover may be described as "TYPE AET with Integral Shell Cover".

FIGURE N-1.2



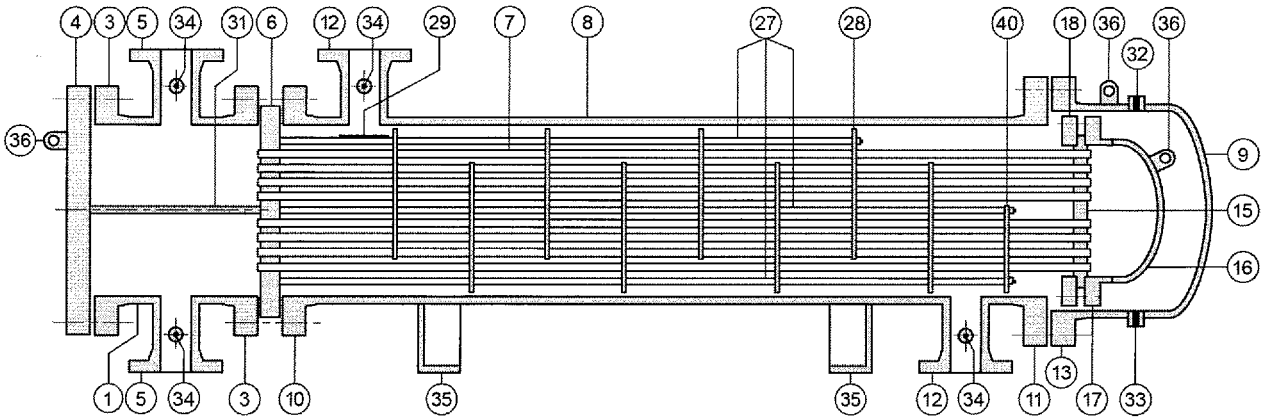
N-2 NOMENCLATURE OF HEAT EXCHANGER COMPONENTS

For the purpose of establishing standard terminology, Figure N-2 illustrates various types of heat exchangers. Typical parts and connections, for illustrative purposes only, are numbered for identification in Table N-2.

TABLE N-2

1. Stationary Head-Channel
2. Stationary Head-Bonnet
3. Stationary Head Flange-Channel or Bonnet
4. Channel Cover
5. Stationary Head Nozzle
6. Stationary Tubesheet
7. Tubes
8. Shell
9. Shell Cover
10. Shell Flange-Stationary Head End
11. Shell Flange-Rear Head End
12. Shell Nozzle
13. Shell Cover Flange
14. Expansion Joint
15. Floating Tubesheet
16. Floating Head Cover
17. Floating Head Cover Flange
18. Floating Head Backing Device
19. Split Shear Ring
20. Slip-on Backing Flange
21. Floating Head Cover-External
22. Floating Tubesheet Skirt
23. Packing Box
24. Packing
25. Packing Gland
26. Lantern Ring
27. Tierods and Spacers
28. Transverse Baffles or Support Plates
29. Impingement Plate
30. Longitudinal Baffle
31. Pass Partition
32. Vent Connection
33. Drain Connection
34. Instrument Connection
35. Support Saddle
36. Lifting Lug
37. Support Bracket
38. Weir
39. Liquid Level Connection
40. Floating Head Support

FIGURE N-2



AES